

U.S. DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY  
NATIONAL ENERGY TECHNOLOGY LABORATORY



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## NETL'S ONSITE RESEARCH

As the lead field center for the DOE Office of Fossil Energy's research and development program, the National Energy Technology Laboratory has established a strong onsite research program conducted by Federal scientists and engineers who work closely with employees of contractor organizations and researchers from universities. Onsite R&D – managed by NETL's Office of Research and Development – makes important contributions to NETL's mission of implementing a research, development, and demonstration program to resolve the environmental, supply, and reliability constraints of producing and using fossil resources.

Researchers in NETL's Office of Research and Development perform onsite R&D in support of NETL's technology lines and for external government and industry customers. In addition, NETL's onsite research pursues knowledge, science, and technology with broad societal and industrial interest. NETL onsite R&D helps industrial and academic partners solve problems that would otherwise become barriers to commercializing power systems, fuels, and environmental and waste management technologies. NETL uses a variety of partnership mechanisms to conduct R&D of mutual interest with academic and private-sector organizations. The Office of Research and Development provides DOE's Fossil Energy program an onsite "corporate laboratory" at NETL. The onsite R&D efforts utilize state-of-the-art capabilities and facilities in Morgantown, West Virginia; Pittsburgh, Pennsylvania; and Albany, Oregon. About one-fourth of NETL's approximately 1,100 Federal and contractor employees are involved with onsite research activity. NETL is DOE's only government-owned, government-operated national laboratory; the onsite research program has a core group of about 150 Federal scientists and engineers. Supplemental site support comes from contractors who are selected through a competitive process, as well as research fellows and associates at the faculty, postdoctoral, graduate, and undergraduate levels.

Onsite research is conducted in four primary focus areas: Computational and Basic Sciences, Energy System Dynamics, Geological and Environmental Systems, and Materials Science.

## Energy System Dynamics Focus Area

The Energy System Dynamics Focus Area conceives, analyzes, and develops pre-commercial energy technology that minimizes the environmental impact of fossil fuel use and that maximizes reliable use of domestic energy sources and infrastructure. The focus area addresses turbines and fuel cell hybrids, fuel cells, fuel processing for fuel cells, gasification, carbon dioxide capture for pulverized coal and for integrated gasification combined cycle (IGCC) systems, reciprocating engines, and sensor/control methods for all these energy systems. This focus area is a recognized source of expertise and research leading to commercially viable technology that improves fossil-fuel-based energy systems.



## ADDRESS

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## Focus Area Research

The focus area supports research and development in coal power systems, provides concepts that will be integrated into the FutureGen prototype, and supports the President's Global Climate Change Initiative.

The focus area investigates and tests new energy system concept and technologies, such as:

- Technologies that can capture carbon dioxide during energy generation with minimal cost and efficiency impact
- Methods to use hydrogen combustion in turbines and engines without collateral pollutant emissions or efficiency penalties
- Performance of DOE-developed fuel cells to assist program planning, to validate and establish a common approach to reporting fuel cell performance
- Methods to make fuel cells tolerant to coal gas impurities, allowing fuel cell integration with coal gasification technology
- A core understanding of SOFC fuel cell degradation related to design and operation issues
- Sensors and control techniques that will allow load following in hybrid turbine fuel cell systems
- Fuel reforming and gas cleanup technology that can allow SOFC fuel cells to operate on existing infrastructure fuels (diesel fuel, coal syngas).